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FORESTS IN THE GREEN MOUNTAIN STATE: A HALF-CENTURY OF CHANGE

Department of
Forest, Parks,
and Recreation

Forests provide wood and other forest products, watershed protection, wildlife habitat, biodiversity, a setting for recreation, and much more. They have played a major role in the history and culture of the State of Vermont. Highlighted here are some of the significant trends that have occurred in Vermont's forests over the last half-century. The data in this publication are summarized from reports published by the USDA Forest Service, which periodically inventories the forest resources of the 50 states. In 1997, the USDA Forest Service in cooperation with the Vermont Department of Forests, Parks and Recreation completed the fifth statewide inventory of that State's forests.

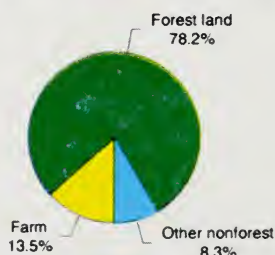
FOREST AREA

Forests dominate Vermont's landscape, covering 4.6 million acres or 78.2 percent of the State. There is 2 percent more forest area than in 1983 and 24 percent more forests than in 1948. Vermont was not always heavily forested. Early settlers cleared nearly two-thirds of the original forest for agriculture. The amount of acreage farmed peaked around the middle of the 19th century, and then began a long decline that has continued to this day. Forests have reclaimed much of the abandoned land. Left undisturbed, fields and pastures naturally go through a series of changes that eventually bring about a new forest. Now, after decades of increases, there are more acres in forest in Vermont than at any time in the last 100 years. Today, cropland and pasture account for only 11 percent of the State's total land area.

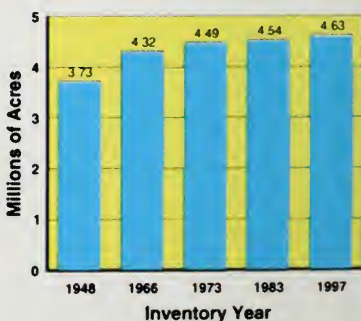
Essex is the most heavily forested county, with 95.2 percent of its area in forest. Chittenden County is the least forested, with 61.4 percent in forest. For statistical purposes, data for Grand Isle and Franklin Counties are combined. Grand Isle has little forest land and would be the least forested if considered separately.

Categorizing forest land is helpful in understanding resource availability and planning forest management. Forest land is categorized by the Forest Service as timberland or noncommercial forest land. Timberland is physically capable of growing timber crops and is potentially available for harvesting. Ninety-seven percent of forest land, or 4.5 million acres, is classified as timberland. Noncommercial forest land includes reserved forest lands, unproductive forests, and urban forests. Management for timber on these lands is administratively restricted or economically impractical. Examples include designated wilderness areas on the Green Mountain National Forest, mountaintops with thin soils, and forests in urban areas. The area of noncommercial forest land in Vermont has increased steadily from 16,000 acres in 1948 to 146,000 acres in 1997. Nearly all of this increase is due to the reclassification of timberland into this category. Most of the noncommercial forest land is in public ownership.

Land Area By Land Use, 1997



Forested Acres In Vermont

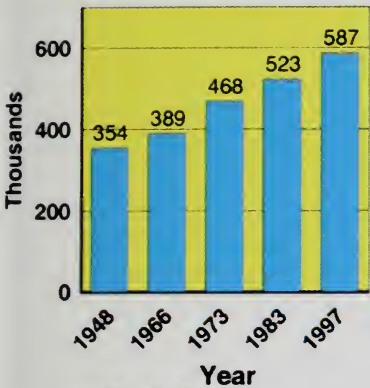


PEOPLE AND FORESTS

The size of the population and how people live on the land are significant forces in shaping the forest. The population of Vermont grew slowly (23 percent) between 1860 and 1960. Around 1960, the State's population began growing at a faster rate. Between 1960 and 1997, Vermont's population increased by more than 50 percent to 589,000.

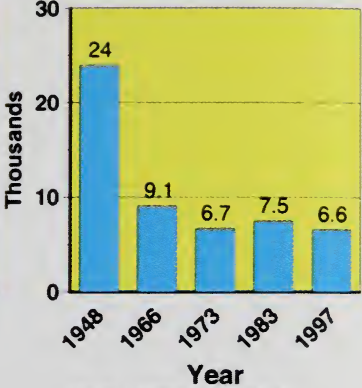
During the last 50 years, the number of farms in Vermont has decreased. The smaller decreases in the more recent years coincide with the smaller increases in forest-land area as reported for recent inventories.

Population of Vermont*



*U S Bureau of the Census

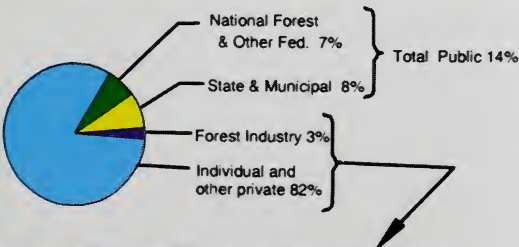
Number of Vermont Farms*



*National Agricultural Statistics Service

Vermont's private forest-land owners are a diverse group of 80,500 individuals and enterprises; they hold 85 percent of Vermont's timberland. This area is divided between forest industry and nonindustrial private owners. State, federal, and other public owners hold the remaining 15 percent. The amount of acreage owned by forest industry has dropped to one-fifth of the 1983 total. Although many in number, owners with small holdings account for a small portion of Vermont's timberland. Half of the private forest-land owners hold fewer than 10 acres; they own only about 2.6 percent of the timberland. These small holdings are primarily sites for houses. The number of owners with fewer than 50 acres of timberland has nearly doubled since 1983.

Ownership of Timberland



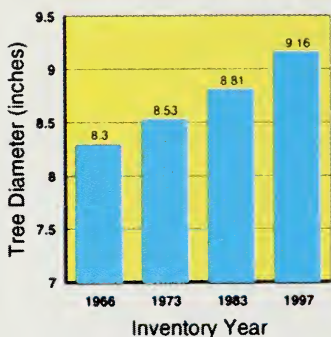
Number of Private Timber-Land Owners and Acres Owned, by Size Class, 1993

Acres Owned	Number of Owners	Total Acres
1-9	40,900	111,900
10-49	19,700	360,700
50-99	10,800	699,200
100-499	8,500	1,496,700
500-999	500	286,400
1,000+	100	846,900
All size classes	80,500	3,801,800

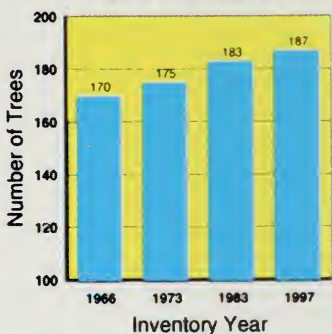
TREES HAVE INCREASED IN SIZE AND NUMBER

How well forests are populated with trees is determined by measures of tree size and number. Vermont has experienced a steady increase in the average diameter (at breast height) of trees 5 inches or more in diameter. Since 1966 (the first inventory to report data by diameter class), the average diameter of trees has increased from 8.3 to 9.16 inches. During the same period, the average number of trees 5 inches or larger in diameter per acre has increased from 170 to 187.

Average diameter of trees larger than 5 inches in diameter

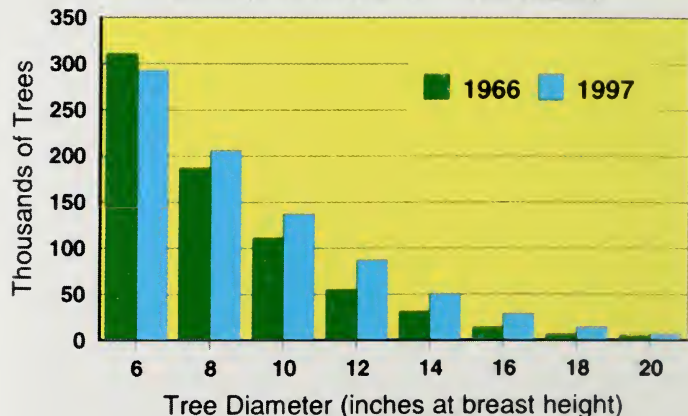


Average number of trees larger than 5 inches in diameter per acre of timberland



Changes in the numbers of trees were not distributed evenly across diameter classes. Since 1966, most of the increase in the number of trees occurred in diameter classes above 8 inches. The number of trees in the 6-inch diameter class has decreased during this period.

Number of Trees on Timberland



TREES HAVE INCREASED IN VOLUME

The increase in the size and number of trees in Vermont has resulted in an increase in the average volume of trees per acre of timberland. Volume decreased to 14.4 cords per acre in 1966, but has increased steadily since then and now averages 26.1 cords per acre.

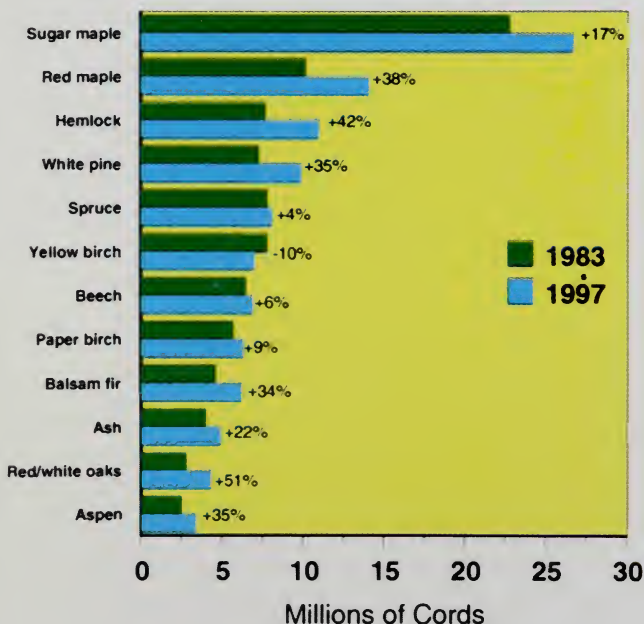
Average Volume Per Acre



When ranked by volume, sugar maple is the leading species followed by red maple. Red maple ranked sixth in volume in 1948.

Volume of Trees on Timberland, for Selected Species and Percent Change, Vermont, 1983 and 1997

(Volume increased by 20.5 percent for all species)

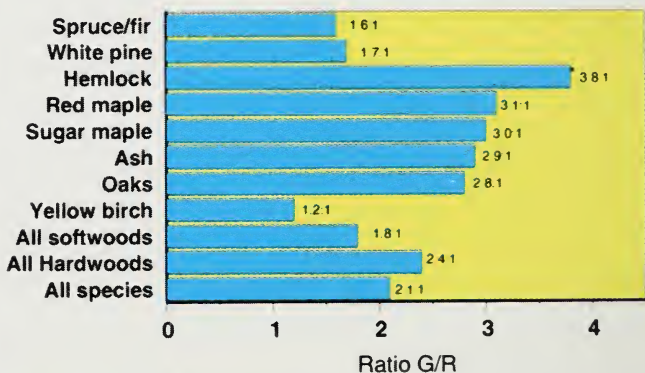


GROWTH AND REMOVALS

Net growth and removals of trees influence the structure and species composition of a forest. Net growth is the total growth of trees plus gains from land coming into forest, minus losses to mortality from insect and disease outbreaks, and disturbances such as wind and ice storms. Removals include harvesting plus losses due to changes in land use. In Vermont, the net growth of trees has exceeded removals since the first inventory in 1948. About twice as much wood has been grown than was cut or otherwise removed.

The ratio of growth-to-removals (G/R) varies among species. Comparing ratios for individual species to the average for all species indicates relative changes for each species. Species with the most favorable G/R ratios are hemlock, red maple, sugar maple, ash, and the oaks. In Vermont, these species are increasing in the portion of the total resource they represent. Historically, cutting pressure has been greater on softwood species (other than hemlock) than on hardwoods. Since 1948, the average G/R ratio has been 1.8:1 for softwoods and 2.4:1 for hardwoods. Ratios are less than 1:1 where removals exceed growth. During the period covered by the most recent inventory (1983-97) the G/R ratio for spruce and paper birch was 0.9 and 0.6, respectively. Relatively high death rates for these species have contributed to their low ratios.

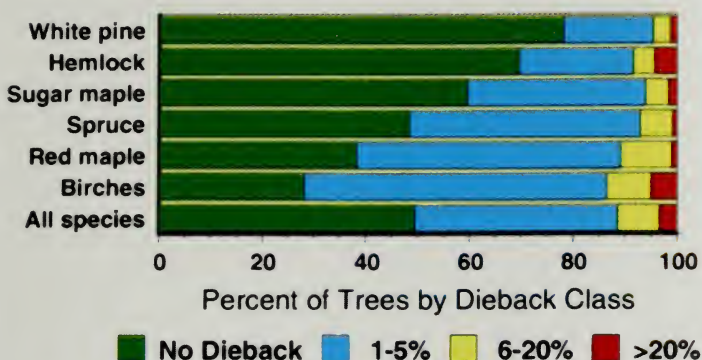
**Ratio of Net Growth to Removals
For Important Species and Groups 1948-97**



FOREST HEALTH

The National Forest Health Monitoring (NFHM) Program looks at a wide set of indicators that reflect forest conditions. One of these measures is crown dieback, or the percentage of branch tips that are dead. Dieback can signal that the tree is being attacked by an insect or disease, or has other health problems. Few trees measured by NFHM scientists in Vermont had significant amounts of crown dieback. Eighty-nine percent of the trees measured had no or very light dieback (1 to 5 percent); only 3 percent of the trees had dieback greater than 20 percent. Differences in dieback among species may indicate differences in tree vigor, though some variations should be expected due to differences in growth characteristics. Observations of dieback and other attributes over time will allow researchers to identify trends and better evaluate forest conditions.

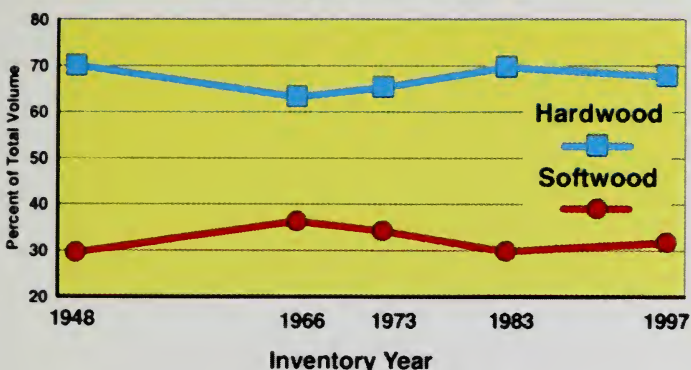
Percent Dieback For Trees Measured in 1996-99 (Important Species And All Species Combined)



CHANGES IN SPECIES COMPOSITION

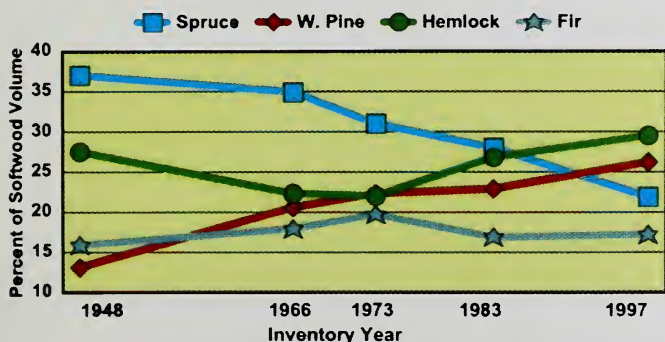
The distribution of volume by softwood and hardwood species in Vermont has changed little during the last 50 years.

Distribution Of Volume

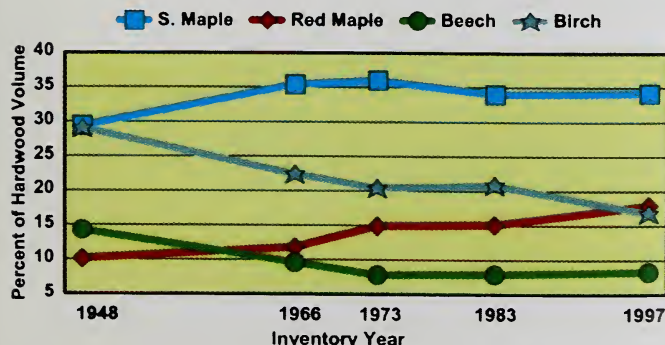


The spruce portion of softwood volume has declined and the portions represented by white pine and hemlock have increased. Birch species have declined in the portion of hardwoods they represent while the portion represented by red maple has increased.

Change In Softwood Composition



Change In Hardwood Composition





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CONCERNS AND OBSERVATIONS

Over the last 50 years in Vermont, land coming into forest from abandoned farms has more than offset losses of forest land due to development. It is doubtful that this will continue over time because of the diminished number of farms and increased development pressure from a growing population. Population increases also influence how forests are used. Greater demands are now being placed on forests to produce both traditional and nontraditional benefits and values. At the same time, parcelization of timberland into smaller holdings has made it more difficult to use the forest in traditional ways. Landowners with small holdings are less likely to manage their forests for timber products, and because many of these small tracts are home sites, their owners may be reluctant to allow others to use their land.

The period from 1948 to the present has been remarkable for the return of Vermont's forest on a wide scale. These forests are maturing as shown by increases in tree size and number and by changes in species composition. Measures of health indicate these trees are in good condition. The challenge for the future will be avoiding a reversal of that good fortune while sustaining the delivery of the variety of goods and services that a growing population expects from the State's valuable forest resource.

For more information contact: Forest Inventory & Analysis (610) 577-4051, or write: USDA Forest Service, FIA Unit, 11 Campus Boulevard, Suite 200, Newtown Square, PA 19073. Website <http://fia.fs.fed.us>

Or call: Vermont Department of Forests, Parks and Recreation, Waterbury State Complex, 103 South Main Street, Waterbury, VT 05676, (802) 828-4037. Website www.state.vt.us/anr/fpr

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